Diphtheria

CLINICAL CASE DEFINITION

An upper-respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose.

CASE CLASSIFICATION

- Probable: A clinically compatible case that is not laboratory confirmed and is not epidemiologically-linked to a laboratory-confirmed case.

- Confirmed: A clinically compatible case that is either laboratory confirmed or epidemiologically-linked to a laboratory-confirmed case.

Comment: Respiratory disease caused by nontoxigenic *Corynebacterium diphtheriae* should be reported as diphtheria. Cutaneous diphtheria should not be reported. All diphtheria isolates, regardless of association with disease, should be sent to the Diphtheria Laboratory, National Center for Infectious Diseases, CDC. Arrangements should be made through the MDCH laboratory.

Note: On rare occasions, respiratory diphtheria may result from infection with other Corynebacterium species (*C. ulcerans* or *C. pseudotuberculosis*). These isolates should also be forwarded to the CDC.

TRANSMISSION

Transmission is most often person-to-person spread from the respiratory tract.

On rare occasions, transmission may occur from skin lesions or articles (fomites) soiled with discharges from lesions of infected persons.

INCUBATION PERIOD

2 – 5 days, range 1 -10 days. See Diphtheria Timeline, below.

REPORTING/INVESTIGATION

Health care providers should report immediately any cases/suspect cases of diphtheria to the local health department serving the residence of the case.

Local health department responsibilities:

- Contact case/guardian and health care provider;

- Determine if case meets clinical case definition;

- If definition met (probable or confirmed cases), investigate using report form/surveillance worksheet and control guidelines given below.

- Notify MDCH Immunization Division Vaccine-Preventable Disease (VPD) Surveillance Coordinator at 517-335-8159.

- Report/ensure reporting of case to the Michigan Disease Surveillance System (MDSS). CDC Diphtheria Surveillance Worksheet may be helpful in field investigation to collect and capture data. Obtain

immunization history information from provider record or MI Care Improvement Registry (MCIR - state immunization registry).

- Update the MDSS record in a timely manner with new or additional info as it becomes available. Finalize MDSS record when case investigation is complete.

- In the event of death, obtain and send copies of hospital discharge summary, death certificate, and autopsy report to MDCH Immunization Division.

LABORATORY CONFIRMATION

Laboratory criteria for diagnosis

- Isolation of Corynebacterium diphtheriae from a clinical specimen; or

- Histopathologic diagnosis of diphtheria.

See **LABORATORY SPECIMENS: PROCEDURES AND CONSIDERATIONS,** below for more details

IMMUNITY/SUSCEPTIBILITY

- Lifelong immunity is usually but not always acquired after disease or inapparent infection.

- Immunization with toxoid produces prolonged, but not lifelong, immunity.

- Serosurveys in the U.S. indicate that 40 percent of adults lack protective levels of circulating antitoxin.

- Antitoxin immunity protects against systemic disease but not colonization in the nasopharynx.

CONTROL MEASURES

Patient-related measures:

- Reports of suspect diphtheria should be investigated immediately.

- Suspect cases should be reported promptly by telephone to MDCH VPD Surveillance Coordinator so that arrangements can be made to obtain diphtheria antitoxin for the patient from CDC and the MDCH Laboratory can be notified to set up for cultures.

  Contact information:
  MDCH VPD Surveillance Coordinator: 517-335-8159
  MDCH Communicable Disease Epidemiology Office: 517-335-8165
  CDC consultation (National Immunization Program): 404-639-8257
  CDC after-hours: 770-488-7100 or 404-639-2888 or 404-639-2889.
  MDCH Laboratory: 517-335-8067

- The patient should be placed in strict isolation, which should be maintained until elimination of the organism is demonstrated by negative cultures of two samples obtained at least 24 hours apart after completion of antimicrobial therapy.

- Obtain both nasal and pharyngeal swabs for culture, if this has not yet been done, to confirm the diagnosis. Ideally these should be collected prior to initiation of antibiotic

treatment.

- Obtain serum for serology studies of antibodies to diphtheria toxin.

- Obtain, if possible, a consultation from an Infectious Disease physician on the patient; consider treatment with diphtheria antitoxin in consultation with MDCH and CDC authorities.

- Begin/assure antimicrobial therapy (antimicrobial therapy is not a substitute for antitoxin treatment). Antimicrobial therapy is recommended until patient can swallow comfortably:

    - intramuscular procaine penicillin G (25,000-50,000 units [kg/d] for children and 1.2 million units/d for adults, in two divided doses, OR
    - parenteral erythromycin (40-50 mg/[kg/d], with a maximum of 2 g/d.

  Once patient can swallow comfortably, oral erythromycin (in four divided doses) OR oral penicillin V (125-250 mg four times daily) may be substituted for a recommended total treatment period of 14 days.

- Administer/assure active immunization with diphtheria toxoid during convalescence, because clinical diphtheria does not necessarily confer immunity.

- Obtain repeat nasal and pharyngeal specimens for culture a minimum of two weeks after completion of antimicrobial treatment to assure eradication of the organism.

- Persons who continue to harbor the organism after treatment with either penicillin or erythromycin should receive an additional 10-day course of oral erythromycin and should submit samples for follow-up cultures.

Contact management:

- Identify close contacts:
    - household members;
    - persons with a history of direct contact with a case-patient (e.g., caretakers, relatives, or friends who regularly visit the home);
    - medical staff exposed to case-patient's oral or respiratory secretions.

- Assess and monitor contacts for signs and symptoms for diphtheria for at least 7 days.

- Obtain nasal and pharyngeal swab specimens from contacts for C. diphtheriae cultures.

- Administer/assure antimicrobial prophylaxis for contacts. Recommended prophylaxis:

    - A single dose of intramuscular benzathine penicillin G (600,00 units for persons <6 years of age and 1.2 million units for persons >= 6 years of age), OR
    - A 7- to 10-day course of oral erythromycin (40 mg/[kg/d]) for children and 1 g/d for adults).

- Assess diphtheria toxoid vaccination history status of contacts:

    - If < 3 doses: Administer immediate dose of diphtheria toxoid and complete primary series according to schedule.
    - If ≥3 doses with last dose >5 years ago: Administer immediate booster dose of diphtheria toxoid.
    - If ≥ 3 doses with last dose <5 years ago: Children in need of their fourth primary

dose should be vaccinated; otherwise vaccination not required.

- Provide information about diphtheria to persons at risk and/or the general public. An excellent Question-&-Answer diphtheria information sheet in **.PDF** format is available from the Immunization Action Coalition.

LABORATORY SPECIMENS: PROCEDURES AND CONSIDERATIONS

Guidelines for Collection of Specimens for Isolation of C. diphtheriae (source: World Health Organization):

Throat Swabs

- Pharynx should be clearly visible and well illuminated.
- Depress tongue with an applicator and swab the throat without touching the tongue or inside of the cheek.
- Rub vigorously over any membrane, white spots, or inflamed areas; slight pressure with a rotating movement must be applied to the swab.
- If any membrane is present, lift the edge and swab beneath it to reach the deeply embedded organisms.

Nasopharygeal specimens

- Insert the swab into the nose through one nostril beyond the anterior nares.
- Gently introduce the swab along the floor of the nasal cavity, under the middle turbinate until the pharyngeal wall is reached. Force must not be used to overcome any obstruction.

Skin Diphtheria and Other Lesions

- Lesions should be cleansed with sterile normal saline and crusted material removed.
- Press the swab firmly into the lesion.

Diphtheria testing may not be available in most clinical laboratories. Contact MDCH Microbiology Laboratory (517-335-8067) and MDCH VPD Surveillance Coordinator (517-335-8159) for further direction.

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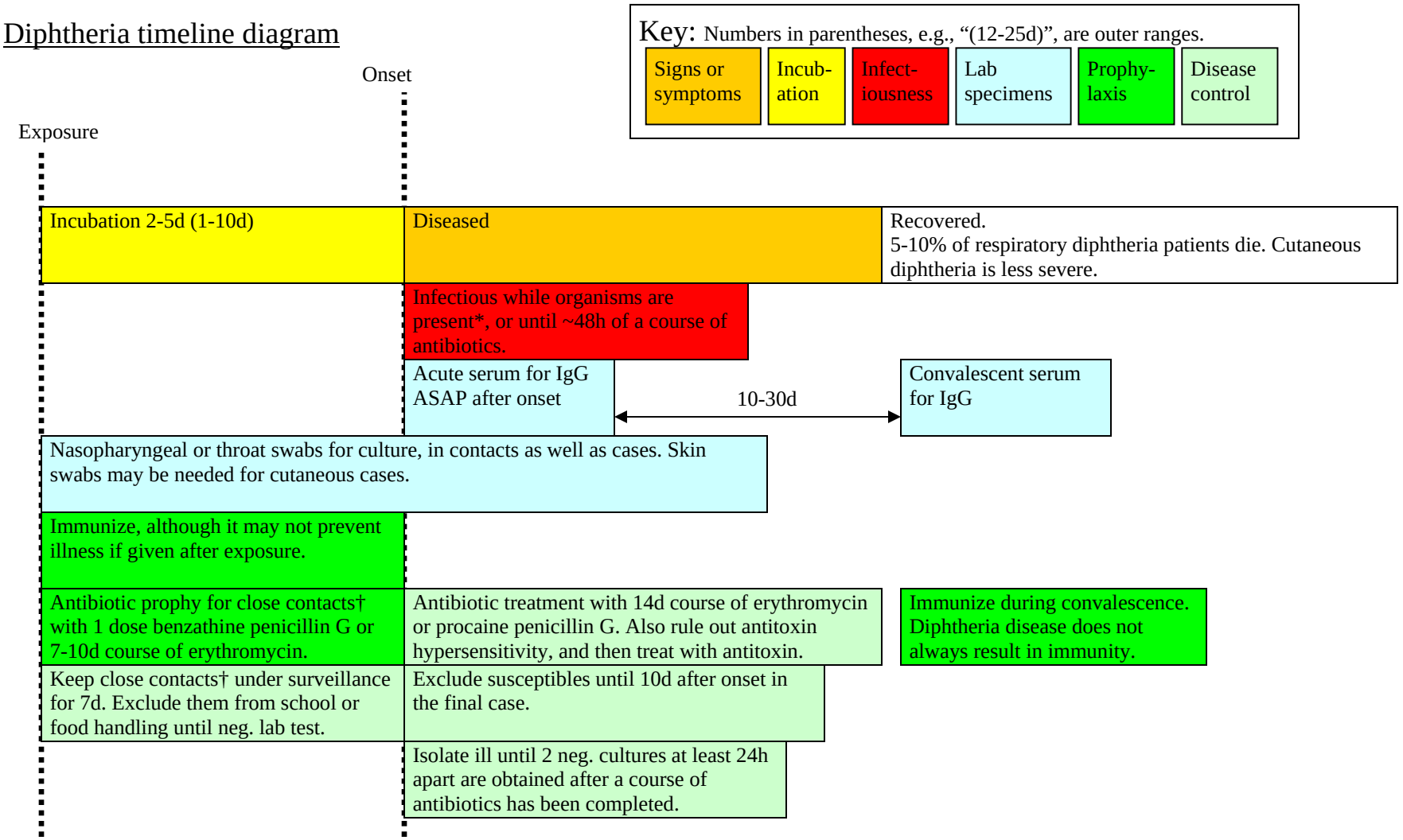
Diphtheria timeline diagram



* Rarely, chronic carriers may shed bacteria for ~6 months.
† This applies to both immunized and nonimmunized close contacts.

Sources: Control of Communicable Diseases Manual, Red Book, Pink Book, CDC VPD surveillance manual